# FORAGE SUITABILITY GROUP Subirrigated

FSG No.: G102AY700SD

**Major Land Resource Area:** 102A - Rolling Till Prairie

## **Physiographic Features**

Most of the soils in this group are found on level and nearly level flood plains, outwash plains, and stream terraces, and in swales, drainage ways, and depressions on uplands, and along shores of glacial lakes.

|                          | <u>Minimum</u> | <u>Maximum</u> |
|--------------------------|----------------|----------------|
| <b>Elevation (feet):</b> | 980            | 1970           |
| Slope (percent):         | 0              | 6              |
| Flooding:                |                |                |
| Frequency:               | None           | Frequent       |
| Duration:                | None           | Brief          |
| Ponding:                 |                |                |
| Depth (inches):          |                |                |
| Frequency:               | None           | None           |
| Duration:                | None           | None           |
| Runoff Class:            | Negligible     | High           |

#### **Climatic Features**

This group occurs in a mid-continental climate characterized by wide seasonal temperature and precipitation fluctuations and extremes.

Annual precipitation varies widely from year to year in MLRA 102A. Average annual precipitation for all climate stations listed below is about 23 inches. About 75 percent of that occurs during the months of April through September. On average, there are about 31 days with greater than .1 inches of precipitation during the same timeframe. Precipitation is less than needed for optimum forage production and is the single largest factor limiting production from this group on non-irrigated lands.

Average annual snowfall ranges from 36 inches at Britton to 48 inches at Tracy. Snow cover at depths greater than 1 inch range from 56 days at Milbank to 105 days at Morris.

Average July temperatures are about 72°F and average January temperatures are about 11°F. Recorded temperature extremes in the MLRA during the years 1961 to 1990 are a low of -40 at Brookings and a high of 108 recorded at both Britton and Milbank. The MLRA lies in USDA Plant Hardiness Zones 4a and 4b.

Average annual wind speeds range from about 8 mph in the eastern part of the MLRA to about 11 mph in the west. The highest wind speeds occur during March through May. It is cloudy about 154 days a year in the west and 166 days in the east. Average morning relative humidity in June is about 86 percent and average afternoon humidity is 59 percent.

The climate data listed in the tables below represent high and low ranges and averages for the climate stations and dates listed. For additional climate data, access the National Water and Climate Center at <a href="http://www.wcc.nrcs.usda.gov">http://www.wcc.nrcs.usda.gov</a>.

|   | From   | To     |
|---|--------|--------|
| Freeze-free period (28 deg)(days):      | 127    | 145    |
| (9 years in 10 at least)                |        |        |
| Last Killing Freeze in Spring (28 deg): | May 22 | May 11 |
| (1 year in 10 later than)               |        |        |

|  | From   | To     |
|--|--------|--------|
| Last Frost in Spring (32 deg):           | May 31 | May 17 |
| (1 year in 10 later than)                |        |        |
| First Frost in Fall (32 deg):            | Sep 08 | Sep 19 |
| (1 year in 10 earlier than)              |        |        |
| First Killing Freeze in Fall (28 deg):   | Sep 17 | Sep 26 |
| (1 year in 10 earlier than)              |        |        |
| Length of Growing Season (32 deg)(days): | 109    | 134    |
| (9 years in 10 at least)                 |        |        |
| Growing Degree Days (40 deg):            | 4066   | 4515   |
| Growing Degree Days (50 deg):            | 2441   | 2698   |
| Annual Minimum Temperature:              | -30    | -20    |
| Mean annual precipitation (inches):      | 19     | 26     |

# Monthly precipitation (inches) and temperature (F):

| 2 years in 10:    | <u>Jan</u> | Feb  | Mar  | Apr  | May  | Jun  | <u>Jul</u> | Aug  | Sep  | Oct  | Nov  | <b>Dec</b> |
|-------------------|------------|------|------|------|------|------|------------|------|------|------|------|------------|
| Precip. Less Than | 0.13       | 0.19 | 0.28 | 0.66 | 1.29 | 1.83 | 1.54       | 0.91 | 0.68 | 0.45 | 0.17 | 0.10       |
| Precip. More Than | 0.97       | 1.08 | 2.70 | 3.68 | 4.83 | 4.92 | 5.21       | 3.75 | 4.63 | 3.32 | 2.19 | 1.19       |
| Monthly Average:  | 0.54       | 0.59 | 1.37 | 2.20 | 2.88 | 3.67 | 3.21       | 2.77 | 2.32 | 1.83 | 0.96 | 0.54       |
| Temp. Min.        | -2.8       | 3.1  | 17.6 | 32.8 | 44.6 | 54.6 | 59.3       | 56.2 | 45.7 | 34.2 | 20.5 | 4.6        |
| Temp. Max.        | 21.4       | 26.5 | 39.3 | 56.5 | 70.4 | 80.5 | 85.5       | 82.9 | 73.2 | 61.0 | 42.0 | 26.6       |
| Temp. Avg.        | 10.1       | 15.9 | 29.0 | 44.6 | 57.2 | 66.8 | 72.0       | 69.5 | 59.3 | 47.5 | 30.8 | 15.6       |

| Climate Station | <b>Location</b> | <u>From</u> | <u>To</u> |
|-----------------|-----------------|-------------|-----------|
| SD1049          | Britton, SD     | 1961        | 1990      |
| SD1076          | Brookings, SD   | 1961        | 1990      |
| SD1739          | Clark, SD       | 1961        | 1990      |
| SD1777          | Clear Lake, SD  | 1961        | 1990      |
| SD5536          | Milbank, SD     | 1961        | 1990      |
| MN5400          | Milan, MN       | 1961        | 1990      |
| MN5638          | Morris, MN      | 1961        | 1990      |
| MN8323          | Tracy, MN       | 1961        | 1990      |
|                 |                 |             |           |

## **Soil Interpretations**

The soils in this group are moderately fine to moderately coarse textured and mostly somewhat poorly drained. They have a seasonal water table within 12 to 48 inches of the surface during part of the growing season.

| <b>Drainage Class:</b> | Poorly drained | To | Moderately well drained |
|------------------------|----------------|----|-------------------------|
| Permeability Class:    | Slow           | To | Moderately rapid        |
| (0 - 40 inches)        |                |    |                         |

Frost Action Class: Moderate To High

|   | <u>Minimum</u> | <u>Maximum</u> |
|---|----------------|----------------|
| Depth:  | 72             |                |
| Surface Fragments >3" (% Cover):                        | 0              | 3              |
| Organic Matter (percent): (surface layer)               | 1.0            | 13.0           |
| Electrical Conductivity (mmhos/cm):                     | 0              | 8              |
| (0 - 24 inches)   |                |                |
| Sodium Absorption Ratio:                                | 0              | 5              |
| (0 - 12 inches)   |                |                |
| Soil Reaction (1:1) Water (pH):                         | 6.1            | 8.4            |
| (0 - 12 inches)   |                |                |
| Available Water Capacity (inches):                      | 6              | 12             |
| (0 - 60 inches)   |                |                |
| Calcium Carbonate Equivalent (percent): (0 - 12 inches) | 0              | 30             |

## **Adapted Species List**

The following forage species are considered adapted to grow on the soils in this group. Additional information concerning plant characteristics of a number of the listed species as well as individual cultivars of many those species can be accessed at <a href="http://plants.usda.gov">http://plants.usda.gov</a>.

| Cool | Season  | Grasses  |
|------|---------|----------|
| COOL | OCASUII | GI asses |

| Canada wildrye          | F |
|-------------------------|---|
| Creeping foxtail        | F |
| Green needlegrass       | F |
| Intermediate wheatgrass | G |
| Meadow bromegrass       | G |
| Orchardgrass            | G |
| Pubescent wheatgrass    | G |
| Reed canarygrass        | G |
| Smooth bromegrass       | G |
| Tall fescue             | G |
| Tall wheatgrass         | G |
| Timothy                 | F |
| Virginia wildrye        | F |
| Western wheatgrass      | F |
| _                       |   |

## Warm Season Grasses

| Big bluestem    | G |
|-----------------|---|
| Indiangrass     | G |
| Little bluestem | F |
| Switchgrass     | G |

## Legumes

| Becames               |   |
|-----------------------|---|
| Alfalfa               | F |
| Alsike clover         | G |
| Birdsfoot trefoil     | G |
| Canada milkvetch      | F |
| Cicer milkvetch       | F |
| Illinois bundleflower | F |
| Purple prairieclover  | F |
| Red clover            | G |
| White prairieclover   | F |
|                       |   |

- G Good adaptation for forage production on this group of soils in this MLRA
- F Fair adaptation but will not produce at its highest potential

#### **Production Estimates**

Production estimates listed here should only be used for making general management recommendations. Onsite production information should always be used for making detailed planning and management recommendations.

The high forage production estimates listed below are based on dense, vigorous stands of climatically adapted, superior performing cultivars. They are properly fertilized for high yields, and pest infestations are kept below economic thresholds. Mechanical harvests are managed to maintain stand life by cutting at appropriate stages of maturity and harvest intervals. If grazed, optimum beginning and ending grazing heights are adhered to. Adequate time is allowed for plant recovery before entering winter dormancy under both uses.

The production estimates listed below represent total annual above ground plant production on an air-dry-matter basis. Estimates of hay and grazing yields can be calculated from these numbers by multiplying them by a harvest efficiency. A 70 percent harvest efficiency is commonly used when converting to hay yields. Pasture harvest efficiency is highly dependent on the grazing management system applied, ranging from 25 to 50 percent.

| Forage Crop                     | Management Intensity |          |  |  |
|---------------------------------|----------------------|----------|--|--|
|                                 | <u>High</u>          | Low      |  |  |
|                                 | (lbs/ac)             | (lbs/ac) |  |  |
| Alfalfa                         | 12900                | 5700     |  |  |
| Alfalfa/Intermediate wheatgrass | 12900                | 5700     |  |  |
| Alfalfa/Orchardgrass            | 12900                | 5700     |  |  |
| Alfalfa/Smooth bromegrass       | 12900                | 5700     |  |  |
| Big bluestem                    | 12900                | 5100     |  |  |
| Creeping foxtail                | 9100                 | 4300     |  |  |
| Intermediate wheatgrass         | 10000                | 4300     |  |  |
| Orchardgrass                    | 10000                | 4300     |  |  |
| Reed canarygrass                | 11400                | 5700     |  |  |
| Smooth bromegrass               | 10000                | 4300     |  |  |
| Switchgrass                     | 12000                | 5100     |  |  |

## **Forage Growth Curves**

Growth curves estimate the seasonal distribution of growth of the various forage crops. They indicate when the forages may be available for grazing or mechanical harvest.

Growth Curve Number: ND0001
Growth Curve Name: Alfalfa
Growth Curve Description: Alfalfa

Percent Production by Month

 Jan
 Feb
 Mar
 Apr
 May
 Jun
 Jul
 Aug
 Sep
 Oct
 Nov
 Dec

 0
 0
 5
 25
 30
 20
 15
 5
 0
 0
 0

**Growth Curve Number:** ND0002

**Growth Curve Name:** Cool season grass **Growth Curve Description:** Cool season grass

**Percent Production by Month** 

 Jan
 Feb
 Mar
 Apr
 May
 Jun
 Jul
 Aug
 Sep
 Oct
 Nov
 Dec

 0
 0
 5
 40
 35
 10
 5
 5
 0
 0
 0

**Growth Curve Number:** ND0003

**Growth Curve Name:** Warm season grass **Growth Curve Description:** Warm season grass

**Percent Production by Month** 

 $\frac{\mathbf{Jan}}{0}$   $\frac{\mathbf{Feb}}{0}$   $\frac{\mathbf{Mar}}{0}$   $\frac{\mathbf{Apr}}{0}$   $\frac{\mathbf{May}}{10}$   $\frac{\mathbf{Jun}}{40}$   $\frac{\mathbf{Jul}}{35}$   $\frac{\mathbf{Aug}}{15}$   $\frac{\mathbf{Sep}}{0}$   $\frac{\mathbf{Oct}}{0}$   $\frac{\mathbf{Nov}}{0}$   $\frac{\mathbf{Dec}}{0}$ 

## **Soil Limitations**

These soils have few limitations to the production of climatically adapted forage crops and production potential is high. Forage species like alfalfa that are less tolerant of saturated soils for extended periods of time may suffer stand loss during wet years when watertables stay abnormally high. Due to the dominant upward movement of water these soils may become saline. A number of them have a high lime content near the surface, which reduces the availability of some plant nutrients. These soils are also subject to compaction if grazed or machinery is operated on them when wet. Coarser textured soils in this group may be subject to soil blowing when establishing new stands.

## **Management Interpretations**

When establishing new stands select species that are tolerant of somewhat poorly drained, occasionally saturated soils, and that are also capable of utilizing the additional moisture inherent to these soils. Excluding livestock and machinery during extended periods of soil wetness will help reduce soil compaction. On coarser textured soils incorporate wind erosion control practices during stand establishment.

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## **FSG Documentation**

**Similar FSGs:** 

FSG ID FSG Narrative

G102AY500S Overflow soils do not have watertables that come as close to the surface during part of the

growing season.

## **Inventory Data References**

Agriculture Handbook 296-Land Resource Regions and Major Land Resource Areas Natural Resources Conservation Service (NRCS) National Water and Climate Center data

USDA Plant Hardiness Zone Maps

National Soil Survey Information System (NASIS) for soil surveys in South Dakota and Minnesota counties in MLRA 102A

South Dakota NRCS SDTG and Minnesota NRCS FOTG

NRCS National Range and Pasture Handbook

Various Agricultural Research Service, Cooperative Extension Service, and NRCS research trials for plant adaptation and production.

#### **State Correlation**

This site has been correlated with the following states: Minnesota and South Dakota

## Forage Suitability Group Approval

**Original Author:** Tim Nordquist

Original Date: 1/30/02

**Approval By:** Dave Schmidt

**Approval Date:** 1/7/03